**Table 01**

|  |  |  |
| --- | --- | --- |
| **Chemicals used for Titration of NaOH Lab** | | |
| Name | Formula | Molar Mass (g/mol) |
| Acetic Acid (Vinegar) | CH3COOH | 60.05 |
| Sodium Hydroxide | NaOH | 40.00 |
| Potassium Hydrogen Phthalate | KHC8H4O4 | 204.23 |

*This is a table that displays the relevant properties for the chemicals used in the lab*

**Table 02**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Titration for the Standardization of NaOH** | | | | |
|  | Trial 1 | Trial 2 | Trial 3 |  |
| Mass KHP (g) | 1.165 | 1.276 | 1.345 |  |
| Moles KHP (mol) | 0.005704 | 0.006248 | 0.006586 |  |
| Volume KHP (mL) | 100.0 | 100.0 | 100.0 |  |
| Molarity KHP (mol/L) | 0.05704 | 0.06248 | 0.06586 |  |
| V1 NaOH (mL) | 0.23 | 0.56 | 0.05 |  |
| V2 NaOH (mL) | 23.08 | 24.01 | 26.41 |  |
| VT NaOH (mL) | 22.85 | 23.45 | 26.36 | Avg Molarity of NaOH |
| Molarity of NaOH (mol/L) | 0.2496 | 0.2664 | 0.2498 | 0.2553 |

*This is table providing raw data for the Standardization of NaOH using KHP. The average molarity of NaOH was then used to titrate a known volume of acetic acid (vinegar)*

**Table 03**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Titration of Vinegar by NaOH** | | | | | | |
|  | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 |  |
| Molarity NaOH (mol/L) | 0.2553 | 0.2553 | 0.2553 | 0.2553 | 0.2553 |  |
| V1 NaOH (mL) | 0.35 | 0.08 | 0.25 | 0.01 | 5.70 |  |
| V2 NaOH (mL) | 33.95 | 43.69 | 29.89 | 32.65 | 40.10 |  |
| VT NaOH (mL) | 33.60 | 43.61 | 29.64 | 32.64 | 34.40 | AVG Molarity of Vinegar |
| Molarity Vinegar (mol/L) | 0.8535 | 0.9089 | 0.7915 | 0.8375 | 0.8782 | 0.8539 |
| Volume Vinegar (mL) | 10.05 | 12.25 | 9.56 | 9.95 | 10.00 |  |

*This is a table providing raw data for the titration of Vinegar (acetic acid) with NaOH. The average molarity of vinegar was then used to determine the percent by mass of acetic acid in vinegar.*

**Table 04**

|  |  |  |  |
| --- | --- | --- | --- |
| **Results** | | | |
|  | Experimental | Theoretical | Percent Error (%) |
| Molarity NaOH (mol/L) | 0.2553 | 0.30 | 14.90% |
| Molarity Vinegar (mol/L) | 0.8539 | 0.83 | 2.88% |
| %Acetic Acid in Vinegar | 5.128 | 5.0 | 2.55% |

*This is a table to display the major results of the Titration Lab*

**Table 05**

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation** | **Equation** | **Example** | **Explanation** |
| **Volume Dispensed by buret** |  |  | This calculation was used for finding the volume of NaOH dispensed by the buret in both the Standardization and Neutralization |
| **g --> mol conversion** |  |  | The mass of KHP was measured out during the lab and dissolved into water, in order for the molarity to be calculated the #moles was needed |
| **Molarity** |  | When 20moles of solute is dissolved in 4.0 L of solution, a 5.0 M solution results | The moles of solute dissolved in 1.0 L solution is the concentration (molarity) |
| **Titration** |  | The amount of moles in 100 mL of 5.0M solution is the same as that in twice the volume of diluted solution ½ the concentration | The titration equation is very similar to the dilution equation and is used to determine equivalent moles of each |
| **Average** |  |  | This is the simple average, calculated since 2nd grade ☺ |
| **Percent Error** |  | The percent difference between the theoretical and experimental values were calculated as 4% | The percent error is a display of the difference between the accepted and experimental values |
| **Percent Acetic Acid in Vinegar** |  | The percent acetic acid in vinegar is found using the molarity of vinegar found during titration, the molar mass of vinegar, and known properties of water | In order to solve for the percent acetic acid in vinegar, the units must be tracked and % AA by mass solved for |